

## 3-8

## Study Guide and Intervention

## Solving Equations and Formulas

**Solve for Variables** Sometimes you may want to solve an equation such as  $V = \ell wh$  for one of its variables. For example, if you know the values of  $V$ ,  $w$ , and  $h$ , then the equation  $\ell = \frac{V}{wh}$  is more useful for finding the value of  $\ell$ . If an equation that contains more than one variable is to be solved for a specific variable, use the properties of equality to isolate the specified variable on one side of the equation.

**Example 1**Solve  $2x - 4y = 8$  for  $y$ .

$$\begin{aligned}
 2x - 4y &= 8 \\
 2x - 4y - 2x &= 8 - 2x \\
 -4y &= 8 - 2x \\
 \frac{-4y}{-4} &= \frac{8 - 2x}{-4} \\
 y &= \frac{8 - 2x}{-4} \text{ or } \frac{2x - 8}{4}
 \end{aligned}$$

The value of  $y$  is  $\frac{2x - 8}{4}$ .

**Example 2**Solve  $3m - n = km - 8$  for  $m$ .

$$\begin{aligned}
 3m - n &= km - 8 \\
 3m - n - km &= km - 8 - km \\
 3m - n - km &= -8 \\
 3m - n - km + n &= -8 + n \\
 3m - km &= -8 + n \\
 m(3 - k) &= -8 + n \\
 \frac{m(3 - k)}{3 - k} &= \frac{-8 + n}{3 - k} \\
 m &= \frac{-8 + n}{3 - k}, \text{ or } \frac{n - 8}{3 - k}
 \end{aligned}$$

The value of  $m$  is  $\frac{n - 8}{3 - k}$ . Since division by 0 is undefined,  $3 - k \neq 0$ , or  $k \neq 3$ .

**Exercises**

Solve each equation or formula for the variable specified.

1.  $ax - b = c$  for  $x$

2.  $15x + 1 = y$  for  $x$

3.  $(x + f) + 2 = j$  for  $x$

4.  $xy + z = 9$  for  $y$

5.  $x(4 - k) = p$  for  $k$

6.  $7x + 3y = m$  for  $y$

7.  $4(c + 3) = t$  for  $c$

8.  $2x + b = c$  for  $x$

9.  $x(1 + y) = z$  for  $x$

10.  $16z + 4x = y$  for  $x$

11.  $d = rt$  for  $r$

12.  $A = \frac{h(a + b)}{2}$  for  $h$

13.  $C = \frac{5}{9}(F - 32)$  for  $F$

14.  $P = 2\ell + 2w$  for  $w$

15.  $A = \ell w$  for  $\ell$

**3-8****Skills Practice****Solving Equations and Formulas**

Solve each equation or formula for the variable specified.

1.  $7t = x$ , for  $t$

2.  $e = wp$ , for  $p$

3.  $q - r = r$ , for  $r$

4.  $4m - n = m$ , for  $m$

5.  $7a - b = 15a$ , for  $a$

6.  $-5c + d = 2c$ , for  $c$

7.  $x - 2y = 1$ , for  $y$

8.  $m + 3n = 1$ , for  $n$

9.  $7f + g = 5$ , for  $f$

10.  $ax - c = b$ , for  $x$

11.  $rt - 2n = y$ , for  $t$

12.  $bc + 3g = 2k$ , for  $c$

13.  $kn + 4f = 9v$ , for  $n$

14.  $8c + 6j = 5p$ , for  $c$

15.  $\frac{x - c}{2} = d$ , for  $x$

16.  $\frac{x - c}{2} = d$ , for  $c$

17.  $\frac{p + 9}{5} = q$ , for  $p$

18.  $\frac{b - 4z}{7} = a$ , for  $b$

Write an equation and solve for the variable specified.

19. Five more than a number  $g$  is six less than twice a number  $h$ . Solve for  $g$ .

20. One fourth of a number  $q$  is three more than three times a number  $w$ . Solve for  $q$ .

21. Eight less than a number  $s$  is three more than four times a number  $t$ . Solve for  $s$ .

**3-8 Practice****Solving Equations and Formulas**

Solve each equation or formula for the variable specified.

1.  $d = rt$ , for  $r$

2.  $6w - y = 2z$ , for  $w$

3.  $mx + 4y = 3c$ , for  $x$

4.  $9s - 5g = -4u$ , for  $s$

5.  $ab + 3c = 2d$ , for  $b$

6.  $2p = kx - q$ , for  $x$

7.  $\frac{2}{3}m + a = a + c$ , for  $m$

8.  $\frac{2}{5}h + g = d$ , for  $h$

9.  $\frac{2}{3}y + v = s$ , for  $y$

10.  $\frac{3}{4}a - q = k$ , for  $a$

11.  $\frac{rx + 9}{5} = h$ , for  $x$

12.  $\frac{3b - 4}{2} = c$ , for  $b$

13.  $2w - y = 7w - 2$ , for  $w$

14.  $3\ell + y = 5 + 5\ell$ , for  $\ell$

Write an equation and solve for the variable specified.

15. Three times a number  $s$  plus 4 times a number  $y$  is 1 more than 6 times the number  $s$ .  
Solve for  $s$ .

16. Five times a number  $k$  minus 9 is two thirds of a number  $j$ . Solve for  $j$ .

**ELECTRICITY** For Exercises 17 and 18, use the following information.

The formula for Ohm's Law is  $E = IR$ , where  $E$  represents voltage measured in volts,  $I$  represents current measured in amperes, and  $R$  represents resistance measured in ohms.

17. Solve the formula for  $R$ .

18. Suppose a current of 0.25 ampere flows through a resistor connected to a 12-volt battery.  
What is the resistance in the circuit?

**MOTION** For Exercises 19 and 20, use the following information.

In *uniform circular motion*, the speed  $v$  of a point on the edge of a spinning disk is  $v = \frac{2\pi}{T}r$ , where  $r$  is the radius of the disk and  $T$  is the time it takes the point to travel once around the circle.

19. Solve the formula for  $r$ .

20. Suppose a merry-go-round is spinning once every 3 seconds. If a point on the outside edge has a speed of 12.56 feet per second, what is the radius of the merry-go-round?  
(Use 3.14 for  $\pi$ .)